

What is claimed is:

1. A process for concentrating weak black liquor to form strong black liquor, said process comprising:

- a. preconcentrating said weak black liquor;
- 5 b. heating said preconcentrated weak black liquor in a heating zone under sufficient pressure to prevent said preconcentrated weak black liquor from boiling in said heating zone;
- c. passing said preconcentrated weak black liquor, having at least one volatile component, into an evaporation zone through one or more orifices;
- 10 d. applying pressure in said evaporation zone that is lower than the vapor pressure of said preconcentrated weak black liquor as it is passed into said evaporation zone, which allows for flash evaporation of at least a portion of said at least one volatile component of said preconcentrated weak black liquor from said preconcentrated weak black liquor to form strong black liquor;
- 15 e. adjusting temperature in said heating zone, pressure in said heating zone and pressure in said evaporation zone to allow for evaporation of an amount of said at least one volatile component from said preconcentrated weak black liquor to form said strong black liquor; and
- 20 f. collecting said strong black liquor from said evaporation zone.

2. The method of claim 1 wherein said evaporation zone has at least one inner surface, and wherein said preconcentrated weak black liquor does not substantially contact said at least one inner surface of said evaporation zone as said preconcentrated weak black liquor passes through said evaporation zone.

25 3. The method of claim 1 wherein said one or more orifices are shaped such that a desired surface area of said preconcentrated weak black liquor is exposed in said evaporation zone.

4. The method of claim 1 wherein said pressure in said heating zone and/or said pressure in said evaporation zone are regulated using one or more pressure sensors.

5. The method of claim 1 wherein the temperature of the preconcentrated weak black liquor prior to said preconcentrated weak black liquor passing into said evaporation zone is regulated using one or more temperature sensors.

5 6. The method of claim 1 wherein a conditions sensor monitors the conditions of the strong black liquor after it is collected from said evaporation zone.

7. The method of claim 1 wherein conditions or properties of the strong black liquor are controlled by regulating the pressure in said evaporation zone and/or by regulating the temperature of the preconcentrated weak black liquor as it is passed into said evaporation zone.

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